A Patient Scheduling System - Toward Cooperative Enterprise-wide Scheduling

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Managed care places severe financial and organizational pressures on institutions, causing them to reengineer themselves from revenue to cost centers[1]. Capitation and competition limits health care resources. Collaborative health care ventures will enable hospitals, ambulatory surgical and diagnostic centers to explore new types of economic and cooperative relationships. Physicians will also need to be affiliated with centers of medical excellence; those facilities, hospital-based or free standing, that deliver high-quality and reasonably priced care. A well-designed patient-scheduling system can contribute to improved efficiency of hospitals operations[2].

Integrated information systems will be necessary to enable cost containment and collaboration. Virtual enterprises will be developed. The information systems which support these developments will be distributed software systems operating on local area networks shared within and between institutions. To explore potential opportunities in this newly collaborative environment, we developed a prototype Patient Scheduling System (PSS) to coordinate scheduling between and within institutions.

PSS was developed collaboratively by researchers from the Department of Anesthesiology and the Artificial Intelligence in Management Laboratory of the Katz Graduate School of Business at the University of Pittsburgh. The principal objectives of PSS include academic fulfillment, improved business efficiency and cost effectiveness, increased patient satisfaction, and statistical analysis of trends in utilization of health services.

PSS is an enterprise-wide distributed scheduling system consisting of three modules which manage locations, time, and personnel. The time module tracks available, scheduled, and actual utilization times. In order to better manage time, PSS incorporates both a predictive and a reactive scheduler, as well as a patient tracking system. The location module maintains patient reservations at inpatient and outpatient locations. Provider staffing is also maintained at patient service locations.

The personnel module maintains patient demographics, address and contact information, referring and attending physicians, insurance particulars, and diagnostic information. A diagnostic coding module maintains and rank orders, in order of importance, diagnostic (ICD-9) and therapeutic (ICD-9/CPT) codes. The module also contains an ICD-9 and CPT code *text browser*, which searches for specific text entries, and displays code listings containing the selected text sequence. The browser can also retrieve coding descriptions based on numeric code queries.

Two types of data are displayed at each workstation: patient-specific data and site-specific data. A peer to peer local area network was employed, with specific read and edit privileges defined for each service area. Access to the scheduling calendars is available, as allowed by remote login permissions.

Scheduling is interactive. Reservations are made from patient care areas and then confirmed by the patient service areas. Reservation conflicts are detected and flagged by the software. Reservations calendars are displayed as Gantt charts or as simple lists. A mouse-driven, click and drag software design was employed to produce user-friendly software.

PSS was written in LISP. Object-oriented programming enables *rapid development*, allowing us to demonstrate our software and information displays to physicians, administrators, nurses, and ancillary personnel involved in the clinical care of patients.

Modern medical centers can benefit from distributed computing and object oriented programming for scheduling patients and resources more efficiently. Distributed computing may enable robust enterprise-wide scheduling between and within cooperating medical facilities on a scale not previously possible.

References

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2. Hancock WM, Isken MW. Patient-scheduling methodologies. Journal of the Society for Health Systems. 1992; 3:83-94.

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